Variety Evaluation for Pasta Making and Sensory Quality

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Evaluation Process:

Emmer varieties were screened for use in local organic food systems

Evaluate 66 varieties of emmer under organic management in 4 locations

Analyze 4 varieties for protein, falling number, and vomitoxin

Evaluate sensory profiles with 13 trained tasters

Assess 4 varieties for pasta making quality
### Overview of Results

Sensory evaluations were conducted on material blended 45% from 2012 and 55% 2014 harvested emmer from one site in Freeville, NY. 

Rank is out of 14 total entries at three sites (Pennsylvania; Freeville, NY; Willsboro, NY) and three years (2012-2014).

<table>
<thead>
<tr>
<th>Variety</th>
<th>Yield</th>
<th>Test Weight</th>
<th>Protein</th>
<th>Pasta Preference</th>
<th>Pasta Shininess</th>
<th>Pasta Roughness</th>
<th>Pasta Graininess</th>
<th>Pasta Firmness</th>
<th>Ability to Dissolve</th>
<th>Grain Preference</th>
<th>Grain Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lucille</td>
<td>1</td>
<td>6</td>
<td>14.1%</td>
<td>0.42*</td>
<td>5.24</td>
<td>4.58</td>
<td>3.88</td>
<td>4.46*</td>
<td>11.12</td>
<td>0.19</td>
<td>5.42*</td>
</tr>
<tr>
<td>ND Common</td>
<td>2</td>
<td>2</td>
<td>13.5%</td>
<td>0.19*</td>
<td>5.88*</td>
<td>3.46*</td>
<td>3.61</td>
<td>3.63*</td>
<td>10.12</td>
<td>0.42*</td>
<td>6.27*</td>
</tr>
<tr>
<td>Red Vernal</td>
<td>4</td>
<td>4</td>
<td>15.0%</td>
<td>0.27</td>
<td>4.84*</td>
<td>5.04</td>
<td>5.65*</td>
<td>6.21*</td>
<td>13.50*</td>
<td>0.15</td>
<td>6.19</td>
</tr>
</tbody>
</table>

*higher scoring, lower scoring, *significantly lower or higher than other varieties at p<0.05
Pasta Sensory Evaluation
13 tasters evaluated 3 varieties over 2 replicates

• **Lucille**: high preference, shininess and roughness; low graininess, cohesion, and firmness
• **Red Vernal**: high preference, roughness, graininess, cohesion, firmness, and earthy flavor; low shininess
• **ND Common**: low preference, roughness, graininess, cohesion, and firmness; high shininess

There were significant differences in preference among varieties at p=0.032

Type 3 ANOVA

\[ H_0: \beta_1 = 0; \alpha \leq 0.10 \]

\[ Y_{ijk} = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} \]

\( Y_{ijk} \): log odds of a flavor used for sample
\( \beta_0 \): intercept log odds
\( \beta_1 \): partial slope associated with variety
\( x_{i1} \): fixed variable of variety \( i \)
\( \beta_2 \): partial slope associated with rep
\( x_{i2} \): fixed variable of rep \( i \)
\( \beta_3 \): partial slope associated with taster
\( x_{i3} \): random variable of taster \( i \)
Pasta Sensory Evaluation

**Shininess**
(1 = matte, 10 = slightly glossy)
N=75

There were significant differences among varieties at $p=0.035$.
Subject accounted for 31.76% of variance.

**Surface Roughness**
(1 = smooth, 10 = rough and coarse)
N=78

There were significant differences among varieties at $p=0.005$.
Subject accounted for 15.97% of variance.
There were significant differences among varieties at p<0.0001. Subject accounted for 17.74% of variance.

There were significant differences among varieties at p<0.0001. Subject accounted for 88.26% of variance.
There were significant differences among varieties at $p<0.0001$. Subject accounted for 44.89% of variance.
Pasta Intensity of Various Flavors

Letters indicate Tukey’s HSD at p<0.05
Cooked Whole Grain Sensory Evaluation

13 tasters evaluated 3 varieties over two replicates

- **ND Common**: highest preference and most chewy texture, dominated by bran, woody, wheat, and nutty flavors
- **Lucille**: low test preference, least chewy, dominated by nutty, wheat, and grassy flavors
- **Red Vernal**: low preference, dominated by earthy, bitter, and wheat flavors

There were significant differences in preference among varieties at p=0.038

Type 3 ANOVA

\[ Y_{ijk} = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} \]

- \( \beta_0 \): intercept log odds
- \( \beta_1 \): partial slope associated with variety \( x_{i1} \)
- \( \beta_2 \): partial slope associated with rep \( x_{i2} \)
- \( \beta_3 \): partial slope associated with taster \( x_{i3} \)

\( Y_{ijk} \): log odds of a flavor used for sample

Error bars are 95% CI
Letters are Tukey’s HSD 95% CI
Whole grain taste intensity ($p=0.326$) and dryness ($p=0.539$) were not significantly different by variety.

There were significant differences among varieties at $p=0.033$. Subject accounted for 21.96% of variance.
There were no significant differences in probability of being rating as most enjoyable flavor among varieties at p=0.55.

There were significant differences in probability of highest taste intensity among varieties at p<0.0001.